

09/923,058

Clean Copy of Pending Claims

1-29. (canceled)

30. (previously presented) A method of etching a semiconductor wafer comprising a silicon oxide layer formed over a silicon nitride layer, the method comprising plasma etching the silicon oxide layer in an etchant environment comprising a fluorohydrocarbon, wherein the fluorohydrocarbon contains at least as many hydrogen atoms as fluorine atoms, and wherein the etchant environment provides silicon oxide-to-silicon nitride selectivity.

31. (previously presented) The method of claim 30, wherein the fluorohydrocarbon is CH_3F .

32. (previously presented) The method of claim 30, wherein the fluorohydrocarbon contains the same number of hydrogen and fluorine atoms.

33. (previously presented) The method of claim 32, wherein the fluorohydrocarbon is CH_2F_2 .

34. (previously presented) The method of claim 30, wherein the etchant environment further comprises a fluorinated gas.

35. (previously presented) The method of claim 34, wherein the fluorinated gas is selected from the group consisting of CF_4 and CHF_3 .

36. (previously presented) The method of claim 34, wherein the etchant environment further comprises an inert gas.

37. (previously presented) The method of claim 36, wherein the inert gas is argon.

38. (previously presented) The method of claim 30, wherein the silicon oxide layer is formed directly above the silicon nitride layer.

39. (previously presented) The method of claim 30, wherein the silicon oxide is selected from the group consisting of undoped silicon oxide and doped silicon oxide.

40. (previously presented) The method of claim 30, wherein the silicon nitride layer is formed with an uneven topography.

41. (currently amended) The method of claim 30, wherein the semiconductor wafer further comprises two conductors, wherein the silicon nitride layer is formed above the conductors, and wherein the plasma etching forms an opening in the silicon oxide between the conductors.

42. (previously presented) The method of claim 30, further comprising heating the semiconductor wafer during plasma etching.
43. (previously presented) The method of claim 42, wherein the semiconductor wafer is heated to between about 20 and 80 degrees C.
44. (previously presented) The method of claim 42, wherein the semiconductor wafer is heated to between about 30 and 60 degrees C.
45. (previously presented) The method of claim 42, wherein the semiconductor wafer is heated to between about 35 and 50 degrees C.
46. (previously presented) The method of claim 42, wherein the semiconductor wafer is heated by heating an electrode adjacent to the semiconductor wafer.
47. (previously presented) The method of claim 46, wherein the electrode is heated to between about 20 and 80 degrees C.
48. (previously presented) The method of claim 46, wherein the electrode is heated to between about 30 and 60 degrees C.
49. (previously presented) The method of claim 46, wherein the electrode is heated to between about 35 and 50 degrees C.
- 50-59. (canceled)
60. (previously presented) The method of claim 30, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 10-to-1.
61. (previously presented) The method of claim 30, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1.
62. (previously presented) The method of claim 30, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1.
63. (previously presented) A method of etching a semiconductor wafer comprising a silicon oxide layer formed over a silicon nitride layer, the method comprising plasma etching the semiconductor wafer in an etchant environment, wherein the method comprises heating the semiconductor wafer during plasma etching to increase the silicon oxide-to-silicon nitride selectivity.
64. (previously presented) The method of claim 63, wherein the etchant environment comprises a fluorohydrocarbon, wherein the fluorohydrocarbon contains at least as many hydrogen atoms as fluorine atoms.
65. (previously presented) The method of claim 64, wherein the fluorohydrocarbon is CH_3F .

66. (previously presented) The method of claim 63, wherein the etchant environment comprises a fluorohydrocarbon, wherein the fluorohydrocarbon contains the same number of hydrogen and fluorine atoms.
67. (previously presented) The method of claim 66, wherein the fluorohydrocarbon is CH_2F_2 .
68. (previously presented) The method of claim 63, wherein the etchant environment further comprises a fluorinated gas.
69. (previously presented) The method of claim 68, wherein the fluorinated gas is selected from the group consisting of CF_4 and CHF_3 .
70. (previously presented) The method of claim 68, wherein the etchant environment further contains an inert gas.
71. (previously presented) The method of claim 70, wherein the inert gas is argon.
72. (previously presented) The method of claim 63, wherein the semiconductor wafer is heated to between about 20 and 80 degrees C.
73. (previously presented) The method of claim 63, wherein the semiconductor wafer is heated to between about 30 and 60 degrees C.
74. (previously presented) The method of claim 63, wherein the semiconductor wafer is heated to between about 35 and 50 degrees C.
75. (previously presented) The method of claim 63, wherein the semiconductor wafer is heated by heating an electrode adjacent to the semiconductor wafer.
76. (previously presented) The method of claim 75, wherein the electrode is heated to between about 20 and 80 degrees C.
77. (previously presented) The method of claim 75, wherein the electrode is heated to between about 30 and 60 degrees C.
78. (previously presented) The method of claim 75, wherein the electrode is heated to between about 35 and 50 degrees C.
- 79-88. (canceled)
89. (previously presented) The method of claim 63, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 10-to-1.
90. (previously presented) The method of claim 63, wherein the silicon oxide-to-silicon nitride selectivity is greater than 20-1.

91. (previously presented) The method of claim 63, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1.
92. (previously presented) The method of claim 63, wherein the silicon oxide layer is formed directly above the silicon nitride layer.
93. (previously presented) The method of claim 63, wherein the silicon oxide is selected from the group consisting of undoped silicon oxide and doped silicon oxide.
94. (previously presented) The method of claim 63, wherein the silicon nitride layer is formed with an uneven topography.
95. (currently amended) The method of claim 63, wherein the semiconductor wafer further comprises two conductors, wherein the silicon nitride layer is formed above the conductors, and wherein the plasma etching forms an opening in the silicon oxide between the conductors.
96. (previously presented) A method of etching a semiconductor wafer containing a silicon oxide layer formed over a silicon nitride layer, the method comprising plasma etching the semiconductor wafer using an etch environment that provides a silicon oxide-to-silicon nitride selectivity of greater than or equal to 10-to-1.
97. (previously presented) The method of claim 96, wherein the etch environment comprises a first gas selected from the group comprising CH_3F and CH_2F_2 .
98. (previously presented) The method of claim 97, wherein the etch environment further comprises a second fluorinated gas.
99. (previously presented) The method of claim 98, wherein the second fluorinated gas is selected from the group consisting of CF_4 and CHF_3 .
100. (previously presented) The method of claim 98, wherein the etch environment further comprises an inert gas.
101. (previously presented) The method of claim 100, wherein the inert gas is argon.
102. (previously presented) The method of claim 96, further comprising heating the semiconductor wafer during plasma etching.
103. (currently amended) The method of claim 102, wherein the semiconductor wafer is heated to between about 20 and 80 degrees C.
104. (currently amended) The method of claim 102, wherein the semiconductor wafer is heated to between about 30 and 60 degrees C.

105. (currently amended) The method of claim 102, wherein the semiconductor wafer is heated to between about 35 and 50 degrees C.

106. (currently amended) The method of claim 102, wherein the semiconductor wafer is heated by heating an electrode adjacent to the semiconductor wafer.

107. (currently amended) The method of claim 106, wherein the electrode is heated to between about 20 and 80 degrees C.

108. (currently amended) The method of claim 106, wherein the electrode is heated to between about 30 and 60 degrees C.

109. (currently amended) The method of claim 106, wherein the electrode is heated to between about 35 and 50 degrees C.

110. (currently amended) The method of claim 97, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1.

111. (currently amended) The method of claim 97, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1.

112. (currently amended) The method of claim 97, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 50-to-1.

113. (currently amended) The method of claim 102, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1.

114. (currently amended) The method of claim 102, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1.

115. (currently amended) The method of claim 96, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 20-to-1.

116-117. (canceled)

118. (currently amended) The method of claim 96, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 30-to-1.

119. (currently amended) The method of claim 96, wherein the silicon oxide-to-silicon nitride selectivity is greater than or equal to 50-to-1.

120. (previously presented) The method of claim 96, wherein the silicon oxide layer is formed directly above the silicon nitride layer.

121. (previously presented) The method of claim 96, wherein the silicon oxide is selected from the group consisting of undoped silicon oxide and doped silicon oxide.

122. (previously presented) The method of claim 96, wherein the silicon nitride layer is formed with an uneven topography.
123. (currently amended) The method of claim 96, wherein the semiconductor wafer further comprises two conductors, wherein the silicon nitride layer is formed above the conductors, and wherein the plasma etching forms an opening in the silicon oxide between the conductors.
124. (new) The method of claim 41, wherein the conductors are comprised of polysilicon.
125. (new) The method of claim 95, wherein the conductors are comprised of polysilicon.
126. (new) The method of claim 123, wherein the conductors are comprised of polysilicon.